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| 10/655,179   | 09/04/2003  | George J. Kluth      | 0180139             | 6788             |
| 25700  | 7590        | 04/25/2005           | EXAMINER            |                  |
| FARJAMI & FARJAMI LLP<br>26522 LA ALAMEDA AVENUE, SUITE 360<br>MISSION VIEJO, CA 92691 |             |                      | TRAN, LONG K        |                  |
|  |             |                      | ART UNIT            | PAPER NUMBER     |
|  |             |                      | 2818                |                  |

DATE MAILED: 04/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/655,179

Applicant(s)

KLUTH ET AL.

Examiner

Long K. Tran

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 01 March 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-6 and 14-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6 and 14-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Response to Amendment*

1. This office action is in response to Amendment filed on March 03, 2005:
2. Claims **7 – 13** and **20** have been cancelled (claims 8 – 13 were canceled in a previous amendment and response).
3. Claims **1** and **14** have been amended.
4. Claims **1 – 6** and **14 – 19** are presented for examination.

### *Claim Rejections - 35 USC § 102*

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

6. Claim **1 – 3, 6, 14 – 16** and **19** are rejected under 35 U.S.C. 102(e) as being anticipated by Shiraiwa et al. (US Patent No. 6,740,605).
7. Regarding claim **1**, Shiraiwa et al. disclose a memory cell structure comprising:  
a semiconductor substrate 16 (fig. 9);  
a first silicon oxide layer 28 (fig. 9) situated over said semiconductor substrate,  
a charge storing layer 30 (fig. 9) *formed from nitrogen radicals (col. 3, lines 19 – 41)* situated over said first silicon oxide layer, said charge storing layer comprising silicon nitride having reduced hydrogen content (col. 2, lines 23 – 28 and 50 – 65), said reduced hydrogen content reducing charge loss in said charge storing layer (Noted: Shiraiwa et al. do not explicitly show reduced hydrogen content reduces charge loss. However, since the ONO structure contains reduced hydrogen content it would reduce charge loss);

a second silicon oxide layer 32 (fig. 9) situated over said charge storing layer;  
a gate layer 24 (fig. 9) situated over said second silicon oxide layer.

Regarding claim 2, Shiraiwa et al. disclose first silicon oxide layer, charge storing layer, second silicon oxide layer, and gate layer forming a gate stack 27 (fig. 9), the gate stack having a sidewall;

a spacer 40 (fig. 9) adjacent to the sidewall of said gate stack, said spacer comprising silicon nitride (col. 13, line 44) having reduced hydrogen content (col. 2, lines 23 – 28 and 50 – 65 and col. 3, lines 19 – 41), said reduced hydrogen content reducing charge loss in said charge storing layer (Noted: Shiraiwa et al. do not explicitly show reduced hydrogen content reduces charge loss. However, since the ONO structure contains reduced hydrogen content it would reduce charge loss).

**Note:**

Claimed limitation: “**formed from nitrogen radicals**” is taken to be a product by process limitation, it is the patentability product and not of recited process steps which must be established. Therefore, when the prior art discloses a product which reasonably appears to be identical with or only slightly different than the product claimed in a product-by process claim, a rejection based on sections 102 or 103 is fair. A product by process claim directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17 (footnote 3). See In re Fessman, 180 USPQ 324,326(CCPA 1974); In re Marosi et al., 218 USPQ 289,292 (Fed. Cir. 1983); and particularly In re Thorpe, 227 USPQ 964,966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product “gleaned” from the process steps, which must be

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determined in a "product by process" claim, and not the patentability of the process.

See also MPEP.2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claim in "product by process" claim or not.

Regarding claim 3, Shiraiwa et al. disclose the gate stack is situated over a channel region 18 (fig. 9) in the semiconductor substrate, said channel region situated between a first terminal region 12 (fig. 9) and a second terminal region 14 (fig. 9).

Regarding claim 6, Shiraiwa et al. disclose the SONOS device known as dual-bit, two-bit or multi-bit memory (col. 1, lines 43, 65 and 66).

Regarding claim 14, Shiraiwa et al. disclose a memory cell structure comprising:  
a semiconductor substrate 16 (fig. 9), a first silicon oxide layer 28 (fig. 9) situated over said semiconductor substrate, a charge storing layer 30 (fig. 9) *formed from nitrogen radicals (col. 3, lines 19 – 41)* situated over said first silicon oxide layer, a second silicon oxide layer 32 (fig. 9) situated over said charge storing layer; a gate layer 24 (fig. 9) situated over said second silicon oxide layer, said memory structure characterized by:

said charge storing layer comprising silicon nitride having reduced hydrogen content (col. 2 , lines 23 – 28 and 50 – 65 and col. 3, lines 19 – 41)): said reduced hydrogen content reducing charge loss in said charge storing layer (Noted: Shiraiwa et al. do not explicitly show reduced hydrogen content reduces charge loss. However, since the ONO structure contains reduced hydrogen content it would reduce charge loss in the charge storing layer).

**Note:**

Claimed limitation: “***formed from nitrogen radicals***” is taken to be a product by process limitation, it is the patentability product and not of recited process steps which must be established. Therefore, when the prior art discloses a product which reasonably appears to be identical with or only slightly different than the product claimed in a product-by process claim, a rejection based on sections 102 or 103 is fair. A product by process claim directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17 (footnote 3). See In re Fessman, 180 USPQ 324,326(CCPA 1974); In re Marosi et al., 218 USPQ 289,292 (Fed. Cir. 1983); and particularly In re Thorpe, 227 USPQ 964,966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product “gleaned” from the process steps, which must be determined in a “product by process ” claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claim in “product by process” claim or not.

Regarding claim **15**, Shiraiwa et al. disclose first silicon oxide layer, charge storing layer, second silicon oxide layer, and gate layer forming a gate stack 27 (fig. 9), the gate stack having a sidewall;

a spacer 40 (fig. 9) adjacent to the sidewall of said gate stack, said spacer comprising silicon nitride (col. 13, line 44) having reduced hydrogen content (col. 2 , lines 23 – 28 and 56 – 65), said reduced hydrogen content reducing charge loss in said charge storing layer (Noted: Shiraiwa et al. do not explicitly show reduced hydrogen

content reduces charge loss. However, since the ONO structure contains reduced hydrogen content it would reduce charge loss in the charge storing layer).

Regarding claim **16**, Shiraiwa et al. disclose the gate stack is situated over a channel region 18 (fig. 9) in the semiconductor substrate, said channel region situated between a first terminal region 12 (fig. 9) and a second terminal region 14 (fig. 9).

Regarding claim **19**, Shiraiwa et al. disclose the SONOS device known as dual-bit, two-bit or multi-bit memory (col. 1, lines 43, 65 and 66).

### ***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims **4, 5, 17 and 18** are rejected under 35 U.S.C. 103(a) as being unpatentable over Shiraiwa et al. (US Patent No. 6,740,605).

10. Regarding claim **4**, Shiraiwa et al. disclose the claimed invention of claim 1 and also show the charge storing layer has a hydrogen content greater than 3 atomic percent (col. 10, lines 62+ and col. 11, lines 1 – 20).

Shiraiwa et al. do not explicitly show the charge storing layer has a hydrogen content less than 1.0 atomic percent as cited in current claim.

However, It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a charge storing layer has a hydrogen content less

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than 1.0 atomic percent as claimed, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art.

Regarding claim 5, Shiraiwa et al. disclose the claimed invention of claim 1 and also show the charge storing layer has a hydrogen content greater than 3 atomic percent (col. 10, lines 62+ and col. 11, lines 1 – 20).

Shiraiwa et al. do not explicitly show the charge storing layer has a hydrogen content between 0 and 0.5 atomic percent as cited in current claim.

However, It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a charge storing layer has a hydrogen content between 0 and 0.5 atomic percent as claimed, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art.

Regarding claim 17, Shiraiwa et al. disclose the claimed invention of claim 14 and also show the charge storing layer has a hydrogen content greater than 3 atomic percent (col. 10, lines 62+ and col. 11, lines 1 – 20).

Shiraiwa et al. do not explicitly show the charge storing layer has a hydrogen content less than 1.0 atomic percent as cited in current claim.

However, It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a charge storing layer has a hydrogen content less than 1.0 atomic percent as claimed, since it has been held that where the general



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conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art.

Regarding claim **18**, Shiraiwa et al. disclose the claimed invention of claim 14 and also show the charge storing layer has a hydrogen content greater than 3 atomic percent (col. 10, lines 62+ and col. 11, lines 1 – 20).

Shiraiwa et al. do not explicitly show the charge storing layer has a hydrogen content between 0 and 0.5 atomic percent as cited in current claim.

However, It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a charge storing layer has a hydrogen content between 0 and 0.5 atomic percent as claimed, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art.

### ***Response to Argument***

11. Applicants' arguments have been fully considered but they are not persuasive.

Applicants argue that Shiraiwa is completely silent as to how the silicon nitride having reduced hydrogen content reduces charge loss in the charge storing.

The examiner agrees. However, according to:

MPEP § 2112

III. < A REJECTION UNDER 35 U.S.C. 102/103 CAN BE MADE WHEN THE PRIOR ART PRODUCT SEEMS TO BE IDENTICAL EXCEPT THAT THE PRIOR ART IS SILENT AS TO AN INHERENT CHARACTERISTIC

Where applicant claims a composition in terms of a function, property or characteristic and the composition of the prior art is the same as that of the claim but the function is not explicitly disclosed by the reference, the examiner may make a rejection under both 35 U.S.C. 102 and 103, expressed as a 102/103 rejection. "There is nothing inconsistent in concurrent rejections for obviousness under 35 U.S.C. 103 and for anticipation under 35 U.S.C. 102." In re Best, 562 F.2d 1252, 1255 n.4, 195 USPQ 430, 433 n.4 (CCPA 1977). This same rationale should also apply to product, apparatus, and process claims claimed in terms of function, property or characteristic. Therefore, a 35 U.S.C. 102/103 rejection is appropriate for these types of claims as well as for composition claims.

The examiner has stated that Shiraiwa et al. do not explicitly show reduced hydrogen content reduces charge loss. However, since the ONO structure contains reduced hydrogen content it would have a characteristic of reducing charge loss in the charge storing layer (see col. 2, lines 27, 28 and 50-53).

For the above reasons, it is believed that the rejections should be sustained. Feature of an invention not found in the claims can be given no patentable weight in distinguishing the claimed invention over the prior art.

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not

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mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Long K. Tran whose telephone number is 571-272-1797. The examiner can normally be reached on Mon-Thu.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on 571-272-1787. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Long Tran *ULT*

April 19, 2005

  
David Nelms  
Supervisory Patent Examiner  
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